AMENDMENT NO. 1 NOVEMBER 2020

TO

IS 13656 : 2019 INTERNAL COMBUSTION ENGINE CRANKCASE OILS FOR AUTOMOTIVE APPLICATION (DIESEL AND GASOLINE) — SPECIFICATION

(Third Revision)

(*Page* 3, *Clause* 3.4) — Insert the following Note at the end:

‘NOTE — Multiple Test Acceptance Criteria (MTAC) — MTAC is any data-based approach for evaluation of the quality and performance of a formulation where more than one test may be run. Generally for a candidate tested once, test data for each criterion shall be a pass. For a candidate tested twice, the mean (average) value of each result shall be a pass. For a candidate tested three or more times, one test might be declared an outlier and thus discarded and the mean (average) value of retained test data for each result shall be a pass. MTAC is applicable to Table 2, Table 3, Table 4, Table 5.1, Table 6.1, Table 7.1 and Table 8.1.’

(*Page* 11, *Table* 6.1 Engine Test Sequence for Diesel Engine Oils for EDL8, *col* (3), *row* 1) — Substitute ‘EDL8’ *for* ‘EDL 7’.

(*Page* 11, *Table* 6.1 Engine Test Sequence for Diesel Engine Oils for EDL8, *col* (1), *row* 4, Caterpillar 1R) — Substitute the following *for* existing:

Test Technique	**Characteristics**	**Requirements EDL8**			**Method of Test, Ref to ASTM**
(1)	(2)	(3)			(4)
		1 test	2 test	3 test	
Caterpillar 1R	Initial oil consumption (IOC), (0h-252h), g/h, average, *Max*	13.1	13.1	13.1	D 6923
	Final oil consumption (FOC), (432h-504h), g/h, average, *Max*	IOC+1.8	IOC+1.8	IOC+1.8	

(*Page* 17, *Table* 9.1 Engine Test Sequence for Petrol Engine Oils, *row* 1 to 3) — Substitute the following:

Test Technique	**Characteristics**	**Requirements**			**Method of Test, Ref to ASTM**
		EPL 2	EPL 3	EPL 4	
(1)	(2)	(3)	(4)	(5)	(6)

for

Test Technique	**Characteristics**	**Requirements EDL8**			**Method of Test, Ref to ASTM**
		EPL 2	EPL 3	EPL 4	
(1)	(2)	(3)	(4)	(5)	(6)
		1 test	2 test	3 test	

[*Page* 19, *Table* 10.1 Engine Test Sequence for Petrol Engine Oils for EPL 5, *col* (1), *Last row*, Sequence VIII), b)] — Substitute the following:

<table>
<tr><th>Test Technique</th><th></th><th>Characteristics</th><th>Primary Performance Criteria EPL 5</th><th>Test Method</th></tr>
<tr><td>(1)</td><td></td><td>(2)</td><td>(3)</td><td>(4)</td></tr>
<tr><td rowspan="3">Sequence VIII</td><td rowspan="3">b)</td><td>Shear Stability</td><td>Refer Note 3</td><td>ASTM D6709</td></tr>
<tr><td colspan="3">or</td></tr>
<tr><td>Shear Stability
(30 Passes)</td><td>Refer Table 11.3A</td><td>ASTM D6278</td></tr>
</table>

for

Test Technique		**Characteristics**	**Primary Performance Criteria EPL 5**	**Test Method**
(1)		(2)	(3)	(4)
Sequence VIII	b)	Shear Stability	Refer Note 3	ASTM D6709

(*Page* 21, *Table* 11.1) — Substitute the following for the existing:

‘Table 11.1 Engine Test Sequence for Petrol Engine Oils for EPL6 and EPL 7

(*Clauses* 3.1.2 *and* 3.4)

Test Technique	**Rated or Measured Parameter**	**Primary Performance Criteria**					**Method of Test (Ref to ASTM)**
		EPL 6		EPL 7		EPL 7 with resource conserving	
(1)	(2)	(3)		(4)		(5)	(6)
		SAE 0W-20, 5W-20, 0W-30, 5W-30, 10W-30	All others	SAE 0W-16, 5W-16, 0W-20, 5W-20, 0W-30, 5W-30, 10W-30	All others	SAE 0W-16, 5W-16, 0W-20, 5W-20, 0W-30, 5W-30, 10W-30	
Sequence III G		Pass	Pass	Pass	Pass	Pass	D7320
	Kinematic Viscosity, percent increase at 40°C, *Max*	150	150	150	150	150	
	Weighted Piston deposit Rating, *Min*	3.5	3.5	4	4	4	
	Cam plus lifter wear, µm, *Max*	60	60	60	60	60	
	Hot Stuck Rings	None	None	None	None	None	
Sequence III GA	Low temperature viscosity performance	Pass	NR	Refer bench test			D4684

Table 11.1 (*Continued*)

Test Technique	**Rated or Measured Parameter**	**Primary Performance Criteria**					**Method of Test (Ref to ASTM)**
		EPL 6		EPL 7		EPL 7 with resource conserving	
(1)	(2)	(3)		(4)		(5)	(6)
Sequence IVA		Pass	Pass	Pass	Pass	Pass	D6891
	Cam wear average, µm, *Max*	90	90	90	90	90	
Sequence VG		Pass	Pass	Pass	Pass	Pass	D6593
	Average engine sludge rating, *Min*	7.8	7.8	8.0	8.0	8.0	
	Rocker arm cover sludge rating, *Min*	8	8	8.3	8.3	8.3	
	Average piston skirt varnish rating, *Min*	7.5	7.5	7.5	7.5	7.5	
	Average engine varnish rating, *Min*	8.9	8.9	8.9	8.9	8.9	
	Oil screen clogging, percent, *Max*	Report	Report	15	15	15	
	Compression ring sticking (hot stuck)	NR	NR	None	None	None	
	Cold stuck rings	NR	NR	Report	Report	Report	
	Oil screen debris, percent	Report	Report	Report	Report	Report	
	Oil ring clogging, percent	Report	Report	Report	Report	Report	

Table 11.1 (*Continued*)

Test Technique	**Rated or Measured Parameter**	**Primary Performance Criteria**					**Method of Test (Ref to ASTM)**
		EPL 6		EPL 7		EPL 7 with resource conserving	
(1)	(2)	(3)		(4)		(5)	(6)
Sequence VID		NR	NR	NR	NR	Pass	D7589
	For SAE XW-16 viscosity grade						
	a) FEI SUM, *Min*, percentage	NR	NR	NR	NR	2.8	
	b) FEI 2, *Min*, percentage, after 100 hours ageing	NR	NR	NR	NR	1.3	
	For SAE XW-20 viscosity grade						
	FEI SUM, *Min,* percentage	NR	NR	NR	NR	2.6	
	FEI 2, *Min,* percentage, after 100h aging	NR	NR	NR	NR	1.2	
	For SAE X W-30 viscosity grade						
	FEI SUM, *Min,* percentage	NR	NR	NR	NR	1.9	
	FEI 2, *Min,* percentage, after 100h aging	NR	NR	NR	NR	0.9	
	For SAE 10W-30 and all other viscosity grades						
	FEI SUM, *Min,* percentage	NR	NR	NR	NR	1.5	
	FEI 2, *Min,* percentage, after 100h aging	NR	NR	NR	NR	0.6	

Table 11.1 (*Concluded*)

Test Technique	**Rated or Measured Parameter**	**Primary Performance Criteria**					**Method of Test (Ref to ASTM)**
		EPL 6		EPL 7		EPL 7 with resource conserving	
(1)	(2)	(3)		(4)		(5)	(6)
Sequence VIII		Pass	Pass	Pass	Pass	Pass	D6709
	Bearing weight. loss, mg, *Max*	26	26	26	26	26	

NOTE — NR implies not required

[*Page* 22, *Table* 11.2 Bench Tests of EPL 6, *col* (1), *row* 22, Sequence VIII)] — Substitute the following for the existing:

Characteristics	**0W-20, 5W-20, 0W-30, 5W-30, 10W-30**	**All Other**	**Method of Test Ref to ASTM**
(1)	(2)	(3)	(4)
(Sequence VIII) Shear Stability	Ten hour stripped kinematic viscosity at 100 C, KV must remain in original grade		ASTM D6709
or			
Shear Stability (30 Passes)	Refer Table 11.3A		ASTM D6278

for

Characteristics	**0W-20, 5W-20, 0W-30, 5W-30, 10W-30**	**All Other**	**Method of Test Ref to ASTM**
(1)	(2)	(3)	(4)
(Sequence VIII) Shear Stability	Ten hour stripped kinematic viscosity at 100 C, KV must remain in original grade		ASTM D6709

[*Page* 23, *Table* 11.3 Bench Tests of EPL 7, *Col* (1), *Row* 26, Sequence viii)] — Substitute the following:

Characteristics	**0W-16, 5W-16, 0W-20, 5W-20, 0W-30, 5W-30, 10W-30**	**All Other**	**Method of Test Ref to ASTM**
(1)	(2)	(3)	(4)
(Sequence VIII) Shear Stability	Ten hour stripped kinematic viscosity at 100 C, KV must remain in original grade		ASTM D6709
or			
Shear Stability (30 Passes)	Refer Table 11.3A		ASTM D 6278

for

Characteristics	**0W-20, 5W-20, 0W-30, 5W-30, 10W-30**	**All Other**	**Method of Test Ref to ASTM**
(1)	(2)	(3)	(4)
(Sequence VIII) Shear Stability	Ten hour stripped kinematic viscosity at 100 C, KV must remain in original grade		ASTM D6709

[*Page* 23, *Table* 11.3 Bench Tests of EPL 7] — Insert the following after the existing Table 11.3:

'For Shear Stability either of CRC L-38/Sequence VIII / ASTM D6278 (30 passes) shall be used. The following Table 11.3A is applicable for shear stability mentioned in Table 10.1, Table 11.2 and Table 11.3:

Table 11.3A Requirements of CRC L-38/Sequence VIII / ASTM D 6278 Tests Stay-in-Grade

(*Clauses* 3.1.2, 3.4; *Table* 10.1, *Table* 11.2 *and Table* 11.3)

Viscosity Grade (1)	**10 hr. Stripped Kinematic Viscosity@100°C, mm^2/S, *Min* (L-38/Sequence VIII)** (2)	**Kinematic Viscosity@100°C, mm^2/S, *Min* (ASTM D 6278)** (3)
XW-16	6.1	5.8
XW-20	6.9	6.5

Table 11.3A (*Concluded*)

Viscosity Grade (1)	**10 hr. Stripped Kinematic Viscosity@100°C, mm²/S, *Min* (L-38/Sequence VIII)** (2)	**Kinematic Viscosity@100°C, mm²/S, *Min* (ASTM D 6278)** (3)
XW-30	9.3	8.5
XW-40	12.5	11.5
XW-50	16.3	15.0
XW-60	21.9	19.8

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